Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: Scenarios for the Application of THz Communications
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Re: IEEE 802.15-10-0749-00-0thz

Abstract: Various proposals to the applications of THz communication systems in different scenarios have been made in a couple of presentations to the IG THz. The technical requirements to operate a THz communication system in these scenarios and the required complexity in the design of these systems are varying significantly. As a consequence different standards may be required. This contribution makes a first attempt to classify scenarios for the application of THz communications.

Purpose: This document is intended to provide input to the development of a Technical Expectation Document by the IG THz

Scope (1/2)

- Various proposals to the applications of THz communication systems in different scenarios in presentations to the IG THz.
  - Different technical requirements to operate a THz communication system in these scenarios
  - Required complexity in the design of these systems is varying significantly
  - In the end different standards may be required.

Scope (2/2)

- This contribution makes a first attempt to identify and classify scenarios for the application of THz communication systems.
- The document is intended to provide input to the development of a Technical Expectation Document by the IG THz

Characterisation of the Operational Conditions for each of the Scenarios

- The scenarios will be described in terms of
  - Operational environment
  - Typical range
  - Specific propagation conditions
  - Requirements for the antenna alignment

Fixed Wireless Links

- **Operational environment:** Links of backbone network; static use; outdoor
- **Typical range:** A few hundred meters up to several kilometers
- **Specific propagation conditions:** LOS; Atmospheric attenuation becomes important
- **Requirements for the antenna alignment:** Highly directive antennas; alignment during the installaton process by radio engineers

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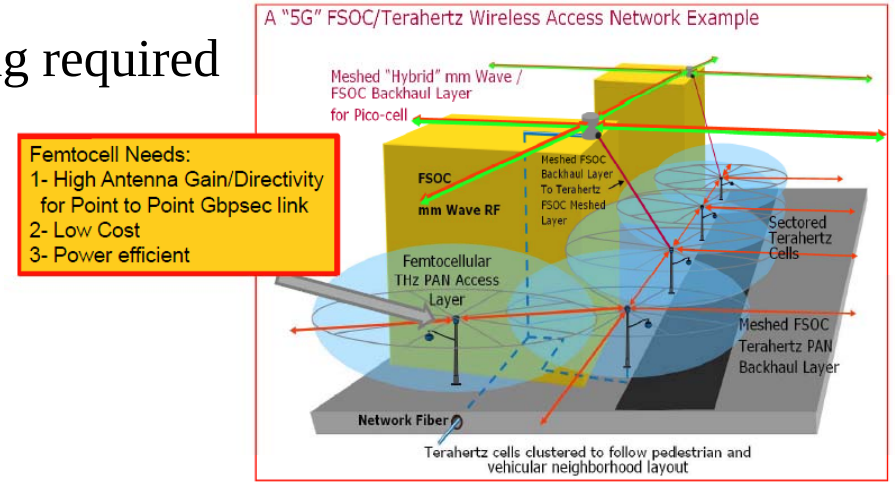
THz Nano Cells

- **Operational environment:** Part of a hierarchical cellular network; potentially mobile users; indoor as well as outdoor
- **Typical range:** < 100m
- **Specific propagation conditions:** LOS/NLOS; dynamically changing conditions
- **Requirements for the antenna**

  alignment: automatic beamsteering required



Courtesy: David Britz: dbritz@research.att.com
AT&T Labs Research – Shannon Laboratories

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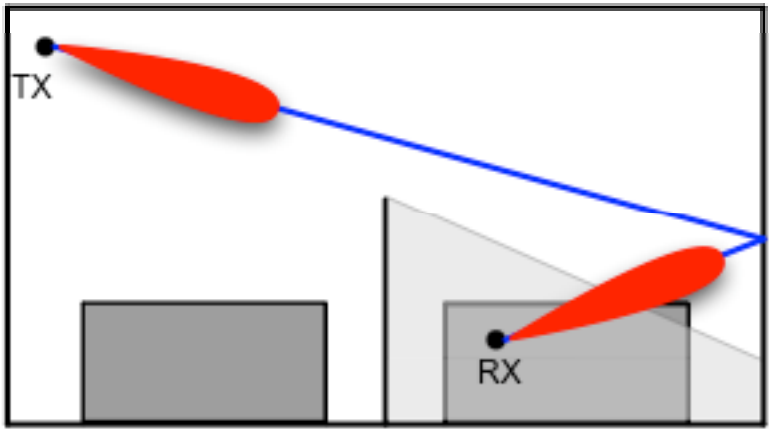
WLAN/WPAN Types of Applications

- **Operational environment:** Connection to access points; nomadic users; mainly indoor
- **Typical range:** < 100m (mostly < 10m)
- **Specific propagation conditions:** LOS/NLOS; dynamically changing conditions
- **Requirements for the antenna alignment:** automatic beamsteering required



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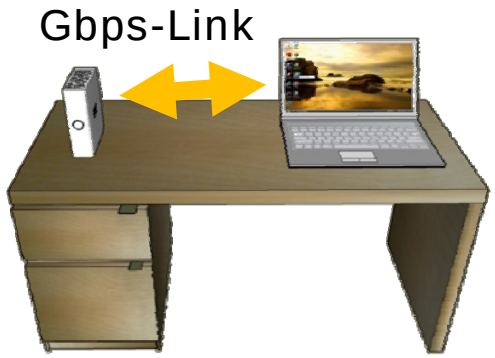
Connecting Devices on Short Ranges

- **Operational environment:** indoor (typically on a desktop), nomadic use
- **Typical range:** a few cm
- **Specific propagation conditions:** LOS, multi paths from nearby objects and multiple reflections from Tx and Rx
- **Requirements for the antenna alignment:** ideally by automatic beamsteering , but manual alignment may be possible



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Kiosk Downloading

- **Operational environment:** indoor, nomadic use
- **Typical range:** a few cm
- **Specific propagation conditions:** LOS, multiple reflections from Tx and Rx
- **Requirements for the antenna alignment:**

  automatic beamsteering (manual alignment may be very difficult)

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Board-to-Board Communications

- **Operational environment:** inside computers, fixed use
- **Typical range:** a few cm
- **Specific propagation conditions:** LOS/NLOS, potentially strong multi paths
- **Requirements for the antenna alignment:**

  fixed alignment during design process possible (automatic beamsteering as an option)